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EXAMINER


LEUNG, JENNIFER A

ART UNIT PAPER NUMBER

1764

DATE MAILED: 01/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/821,858	Applicant(s) ECKARDT ET AL. 	
	Examiner Jennifer A. Leung	Art Unit 1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 October 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2 and 5-13 is/are pending in the application.
- 4a) Of the above claim(s) 11-13 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,5,6 and 8-10 is/are rejected.
- 7) ☒ Claim(s) 7 is/are objected to.
- 8) ☒ Claim(s) 1,2 and 5-13 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. Applicant's amendment submitted on October 6, 2003 has been received and carefully considered. Claims 3 and 4 have been cancelled. Claims 11-13 are withdrawn from consideration. Claims 1, 2, 5-13 remain active.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 1, 2, 5, 6, 8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Henrie (US 3,907,981) in view of Nishino (JP 64-020498) and Saalfrank (DE 33 39 242).

Regarding claims 1 and 10 (FIG. 1-6; column 2, line 52 to column 3, line 10; column 3, lines 32-36; column 4, lines 18-52), Henrie discloses a device comprising:

- a heating chamber 4;
- a feed line (i.e. inlet conduit 10) for feeding a gas mixture having a hydrogen content into said heating chamber 4;
- a blower 8 connected in said feed line 10 and having a delivery rate; and
- a control unit 14, 16, 18, 19 associated with said heating chamber 4 for adjusting the temperature of the heater in response to a parameter characteristic (i.e. a measured temperature value of the gas mixture flowing out of said heating chamber 4, determined by temperature controllers 14, 16).

Henrie is silent as to whether the control unit 14, 16, 18, 19 may instead be associated with the blower 8, for adjusting the delivery rate of said blower 8 in dependence on the

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parameter characteristic (i.e. the gas mixture temperature). In any event, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to modify the control unit of Henrie, such that the control unit was associated with the blower, on the basis of suitability for the intended use and absent showing any unexpected results thereof, since such control schemes are conventionally known in the art, as evidenced by Nishino, and furthermore, the substitution of one known equivalent technique for another may be obvious even if the prior art does not expressly suggest the substitution. *Ex parte Novak* 16 USPQ 2d 2041 (BPAI 1989); *In re Mostovych* 144 USPQ 38 (CCPA 1964); *In re Leshin* 125 USPQ 416 (CCPA 1960); *Graver Tank and Manufacturing Co. v. Linde Air Products Co.* 85 USPQ 328 (USSC 1950). In particular, Nishino (Abstract; FIG. 1) teaches a device, substantially similar to the device of Henrie, comprising a heater 13; a feed line for feeding a gas mixture having a hydrogen content into said heater 13; and a blower 7 connected in said feed line and having a delivery rate; wherein the device further comprises a control scheme having a control unit (i.e. comprising computing elements 9, 10) associated with the blower 7 for adjusting the delivery rate of said blower 7 (indirectly via flow rate controller 3) in dependence on the temperature of the gas mixture flowing out of said heater 13 (i.e. via signals from temperature sensors 11, 12).

In view of the newly incorporated limitations (originally found in the now cancelled claims 3 and 4), Henrie discloses, "the heater 4 may be conventional," (column 2, lines 59-60), but is silent as to whether the heater 4 may comprise a heating chamber having a number of heating elements, wherein each of said heating elements is disposed within a respective flow pipe. In any event, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select such a heater for the heater 4 in the modified

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apparatus of Henrie, on the basis of suitability for the intended use and absent showing any unexpected results thereof, since such a heater is conventionally known in the art, as evidenced by Saalfrank; and furthermore, the substitution of known equivalent structures involves only ordinary skill in the art. *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958). In particular, Saalfrank (FIG. 1, 2) teaches a heating vessel 1 for oxidizing hydrogen-containing air, comprising a plurality of straight heating rods 25 arranged parallel to one another (i.e., a total of 24 rods, only one of which is illustrated), wherein the heating rods 25 are each surrounded by flow pipes 24, so as to achieve effective heat transfer by means of a narrow annular gap 30.

Regarding claim 2, Nishino further teaches the control scheme comprises a hydrogen sensor for determining the hydrogen content of the gas mixture, said control unit having an input side connected to said hydrogen sensor (i.e. "Computing elements 9, 10 automatically regulate the opening degree of the inlet flow rate... using the average value m% of the measured concn. value m1% of the hydrogen in the dry well obtd. by the atmosphere monitor... "; Abstract).

Regarding claim 5, Henrie discloses a reaction chamber 6 connected at the downstream side of said heating chamber 4 (FIG. 1; column 2, lines 52-68).

Regarding claim 6, Henrie discloses a static mixer 6 connected downstream of said heating chamber 4. The reaction chamber 6 of Henrie meets the claim of a "static mixer", since the reaction chamber functions "... to retain the gases therein for a time interval which is sufficient to allow the thermal recombination reaction and to mix previously reacted gases with the newly delivered gases from the heater 4; (column 2, lines 52-68; FIG. 1-6).

Regarding claim 8, the heater (as modified by Saalfrank above) comprises an internally insulated housing (i.e., the housing being insulated by thermal isolation material **42**; FIG. 1).

3. Claims 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Henrie (US 3,907,981) in view of Nishino (JP 64-020498) and Saalfrank (DE 33 39 242), as applied to claims 1 and 8 above, and further in view of Shimada et al. (US 4,430,292) and Henrie (US 3,755,075).

Nishino further teach that after heating, the gas may be cooled downstream by a "cooler" **15** and separated via steam separator **16** (FIG. 1, Abstract). However, the collective teachings of Henrie, Nishino and Saalfrank are silent as to specifically "a splash cooler" connected on the downstream side of the heating chamber, in the modified apparatus of Henrie. Shimada teaches an apparatus for the recombination of hydrogen with oxygen gas, comprising a recombining unit **13** having a heater **12** disposed within, wherein a condenser or "splash cooler" **15** is connected to the downstream side of the recombining unit **13** for cooling the gases exiting unit **13** (FIG. 1, 2; column 3, line 22 to column 4, line 53). It would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to provide a "splash cooler" connected to the downstream side of the heating chamber in the modified apparatus of Henrie, on the basis of suitability for the intended use, since the provision of a cooling means would enable the generated water vapor from the recombination reaction to be condensed out and separated, and a splash type cooler provides increased heat transfer efficiency between the cooling water and the gases in comparison with the use of a conventional shell and tube heat exchanger, as taught by Shimada et al. (column 4, lines 17-26).

Although collectively silent as to the housing of the splash cooler being directly

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connected to the internally insulated housing in the modified apparatus of Henrie, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to modify the splash cooler in the modified apparatus of Henrie according to such a configuration, on the basis of suitability for the intended use, since making elements integral involves ordinary skill in the art, and integral recombination and condenser devices are conventionally known in the art, as evidenced by Henrie '075 (see FIG. 3, which illustrates a condenser-type recombiner **108** comprising spray condenser **112**, **114**; column 5, lines 36-65).

Response to Arguments filed October 6, 2003

4. Applicant's amendment and arguments with respect to the rejection of claims 1, 3, 4, 5, 8 and 10 under 35 U.S.C. 102(b) as being anticipated by Taylor et al. (U.S. 3,706,535) have been fully considered and are persuasive. Therefore, said rejection has been withdrawn.

5. Applicant's amendment and arguments with respect to the rejection of claims 1, 2, 5 and 10 under 35 U.S.C. 102(b) as being anticipated by Nishino (JP 64-020498) have been fully considered and are persuasive. Therefore, said rejection has been withdrawn.

6. Applicant's amendment and arguments with respect to the rejection of claims 1, 5 and 10 under 35 U.S.C. 102(b) as being anticipated by Goto et al. (JP 51-117193) have been fully considered and are persuasive. Therefore, said rejection has been withdrawn.

7. Applicant's arguments with respect to the rejection of claims 1, 2, 5, 6, 8 and 10 under 35 U.S.C. 103(a) as being unpatentable over Henrie (US 3,907,981) in view of Nishino (JP 64-020498) and Saalfrank (DE 33 39 242) have been fully considered but they are not persuasive.

On page 10 (third paragraph) of the response, applicants argue,

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"... one with ordinary skill in the art would have no motivation to combine the cited references. Henrie discloses a complete concept for a recombination device. Henrie uses temperature parameters as reference variables as the control principle. Thus, the system is neither designed nor suited for being operated with a varying delivery rate of the blower, instead of the temperature parameters."

However, the examiner respectfully disagrees and maintains that there would have been proper motivation to combine the references. The examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

In this case, an example of such teaching, suggestion, or motivation may be found in Henrie '981, column 4, lines 45-52 (with emphasis added), which discloses,

"The temperature of the process gas leaving the heater 4 may be reduced several hundred degrees depending on reactant concentrations, without interrupting the reaction. *The actual amount of increase in temperature of the process gas after it leaves heater 4 until it is reacted in reaction chamber 6 will be directly proportional to the amount of reactants contained in the process gas,*"

thereby suggesting to one having ordinary skill in the art that a direct relationship exists between the variables of temperature and flow rate of reactants.

Henrie uses a control scheme of *varying the temperature of heater 4* in order to control the temperature of the reaction in chamber 6, and Nishino (as commented above) uses a control scheme of *varying the flow rate of input gas via blower 7* in order to control the temperature of reaction chamber 14. Though different in technique (i.e., varying heater temperature versus varying blower flow rate), both control schemes achieve substantially the same result (i.e.,

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control of the temperature in the reaction chamber), which additionally supports the suggestion that a direct relationship exists between the variables of temperature and flow rate of reactants.

On page 11 (first paragraph) of the response, applicants further argue,

"The heater 4 mentioned by the Examiner for further argumentation is solely provided as a preheater for the gas mixture flowing into the reaction chamber 6. For that reason already, the heater cannot be taken as a basis for the design of the heating elements now provided according to the invention, and the flow pipes assigned thereto. Thus, one with ordinary skill in the art has no incentive to build the heater 4 according to the concept disclosed in Saalfrank."

However, the examiner respectfully disagrees. As noted in column 3, lines 32-36 (with emphasis added), Henrie '981 discloses,

"In use, process gases, containing free hydrogen and oxygen, are delivered by blower 8 into the heater 4 and are initially *heated to a temperature of about 1,200 °F*".

Also, in column 4, lines 55-60 (with emphasis added), Henrie '981 discloses,

"For gases containing more than about 2% hydrogen, *the heater gas exit temperature is first controlled to about 1,200 °F*. At this point some of the reaction takes place in the heater and some in the reaction chamber."

Structurally comparing the heating device of Saalfrank to heater 4 of Henrie, the heating device of Saalfrank (FIG. 1) comprises a plurality of heating "staffs" 25, each being surrounded by a respective flow pipe 24, thereby defining an annular flow gap 30. Functionally comparing the heating device of Saalfrank to the heater 4 of Henrie, the heating device of Saalfrank heats the gas mixture to a temperature of about 650 °C, equivalent to 1,202 °F, with water vapor being formed and carried forward due to the high temperature (column 3, lines 4-12). Given that both the heater 4 of Henrie and the heating device of Saalfrank are inherently capable of controlling the temperature of the gas mixture to approximately 650 °C (or 1,200 °F), the examiner maintains that one having ordinary skill in the art at the time the invention was made would have proper

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incentive to build the heater 4 according to the concept disclosed by Saalfrank.

Allowable Subject Matter

8. Claim 7 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, since the stated prior art is silent as to the apparatus further comprising a reaction chamber disposed downstream of the static mixer, wherein a duct system connected to the reaction chamber contacts the static mixer, thereby carrying a partial stream from the reaction chamber to heat the static mixer.

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a). A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

* * *

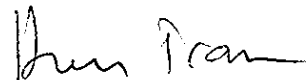
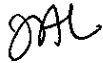
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is (571) 272-1449. The examiner can normally be reached on 8:30 am - 5:30 pm M-F, every other Friday off.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Jennifer A. Leung
December 29, 2003



HIEN TRAN
PRIMARY EXAMINER